

#2 / S. C. Hawkins  
11/29/99

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: AKAMATSU et al.

**PATENT APPLICATION**

Serial Number: Div. of S.N. 08/769,529

Group Art Unit: Unassigned

Filed: Herewith

Examiner: Unassigned

For: INTEGRATED ELECTRONIC DEVICE HAVING FLIP-CHIP CONNECTION WITH  
CIRCUIT BOARD AND FABRICATION METHOD THEREOF

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231  
Sir:

September 9, 1999

Prior to examination on the merits, please amend the above-identified application as follows:

**IN THE SPECIFICATION:**

Please amend the specification as follows:

Page 1, line 20, change "a adhesive" to --an adhesive--.

N.E. Page 6, line 19, change "a adhesive" to --an adhesive--;

line 25, after "metal." insert --Titanium, chromium or alloys of aluminum,

chromium or titanium are other suitable materials for electrode pad 2.--

Page 9, line 2, after "in" insert -the--.

Page 10, last line, change "an" to --a--.

Page 11, line 4, before "preferred" insert --the--.

Page 12, line 9, after "by" insert --a--;

line 11, delete "from".

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a<sup>1</sup>

Page 15, last line, after "(Sn)," insert --silver (Ag).--.

IN THE CLAIMS:

NO SUPPORT

Please cancel claims 1-16 and 22-24 without prejudice or disclaimer.

Please add new claims 25-36 as follows:

a2  
cont.  
--25. A method for fabricating an integrated electronic device according to claim 17,  
wherein the first substrate is a semiconductor chip and the second substrate is a circuit board.

26. A method for fabricating an integrated electronic device according to claim 21,  
wherein the first substrate is a semiconductor chip and the second substrate is a circuit board.

27. An integrated electronic device comprising:  
a first substrate having a first electrode formed on a first surface of the first  
surface;  
a second substrate having a second electrode formed on a first surface of the  
second substrate, the second substrate opposing to the first substrate so that the second electrode  
is aligned to the first electrode; and  
an electronic connection connecting the first electrode with the second electrode,  
the electronic connection consisting of first, second and third solder regions arranged in series  
between the first and second electrodes such that the first region is electrically connected with the  
first electrode and the second region while the third region is electrically connected with the  
second electrode and the second region.

28. The integrated electronic device according to claim 27, wherein the three solder  
regions are characterized by three respective melting temperatures.

29. The integrated electronic device according to claim 27, wherein each of the solder

regions has a respective solder composition.

30. The integrated electronic device according to claim 27, wherein the first solder region has a trapezoidal shape tapering down to the second region.

31. The integrated electronic device according to claim 28, wherein the second solder region has a melting temperature lower than both melting temperatures of the first and third solder regions.

32. The integrated electronic device according to claim 29, wherein the second solder region is made of an eutectic alloy consisting of solder metal components of the first and third solder regions.

33. The integrated electronic device according to claim 27, wherein at least one of the first and third electrodes has a repellent tendency against molten solder.

34. The integrated electronic device according to claim 27, wherein at least one of the first and third electrodes has an adhesive tendency to molten solder.

35. The integrated electronic device according to claim 28, wherein an operating temperature of the integrated electronic device is higher than a melting temperature of the second solder region, and lower than both melting temperatures of the first and third solder regions.

36. An integrated electronic device comprising:

a first substrate having a first electrode formed on a first surface of the first substrate;

a second substrate having a second electrode formed on a first surface of the second substrate, the second substrate opposing to the first substrate such that the second electrode is aligned to the first electrode; and

an electronic connection connecting the first electrode with the second electrode,

the electronic connection having a solder portion therein through which a whole electric current flowing through the electronic connection flows, wherein a melting temperature of the solder portion is lower than an operating temperature of the integrated electronic device and higher than a room temperature.--

**REMARKS**

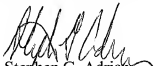
Claims 17-21 and 25-36 are pending. The above-amendments are made to place the application in better condition for examination.

Prompt and favorable action on the merits is earnestly solicited.

In the event that this paper is not timely filed, applicants respectfully petition for an appropriate extension of time. The fee for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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